

IN THE CLAIMS:

21. (Previously Presented) An antenna structure, comprising:
 - an antenna trace formed on a substrate;
 - a ground plane formed on said substrate, wherein said ground plane is non-overlapping with said antenna trace; and
 - an insulation region extending through said substrate and located between said antenna trace and said ground plane.
22. (Previously Presented) The antenna structure recited in Claim 21, wherein said ground plane is coplanar with said antenna trace.
23. (Previously Presented) The antenna structure recited in Claim 21 wherein said insulation region includes a plurality of insulation regions.
24. (Previously Presented) The antenna structure recited in Claim 23 wherein each of said insulation regions are separated by a portion of said substrate.
25. (Previously Presented) The antenna structure recited in Claim 21 wherein said insulation region is an opening that extends through said substrate and an insulator of said insulation region is air.

26. (Previously Presented) The antenna structure recited in Claim 21 wherein said insulation region includes an insulation material selected from a group consisting of:

ABS plastic;

ceramic; and

Teflon.

27. (Previously Presented) The antenna structure recited in Claim 21 wherein said substrate is a lossy substrate and said insulation region causes an antenna radiation efficiency of said antenna structure to be about -0.5dB or better.

28. (Previously Presented) A method of manufacturing an antenna structure, comprising:
forming an antenna trace on a substrate;
forming a ground plane on said substrate, wherein said ground plane is non-overlapping with said antenna trace; and
creating an insulation region extending through said substrate and located between said antenna trace and said ground plane.

29. (Previously Presented) The method recited in Claim 28, wherein said ground plane is coplanar with said antenna trace.

30. (Previously Presented) The method recited in Claim 28, wherein said creating includes creating a plurality of insulation regions.

31. (Previously Presented) The method recited in Claim 28, wherein said creating a plurality of insulation regions includes creating a plurality of insulation regions separated by a portion of said substrate.

32. (Previously Presented) The method recited in Claim 28, wherein said creating an insulation region includes creating an opening that extends through said substrate and wherein an insulator of said insulation region is air.

33. (Previously Presented) The method recited in Claim 32, wherein said creating an opening includes drilling a hole in said substrate.

34. (Previously Presented) The method recited in Claim 28, wherein said creating includes creating an insulation region having an insulation material selected from a group consisting of:

ABS plastic;

ceramic; and

Teflon.

35. (Currently Amended) The method recited in Claim 28, wherein said forming includes forming antenna traces located on opposing surfaces of said substrate interconnected by vias a via extending through said substrate.

36. (Previously Presented) A printed circuit board (PCB), comprising,
a substrate having a ground plane and conductive traces formed thereon; and
an antenna structure, including:
 an antenna trace formed on said substrate;
 said ground plane formed on said substrate, wherein said ground plane is non-overlapping with said antenna trace; and
 an insulation region extending through said substrate and located between said antenna trace and said ground plane.

37. (Previously Presented) The PCB recited in Claim 36, wherein said ground plane is coplanar with said antenna trace.

38. (Previously Presented) The PCB recited in Claim 36, further including electrical components mounted on said substrate and interconnected between at least one of said conductive traces and said ground plane to form an operative circuit.

39. (Previously Presented) The PCB recited in Claim 36, wherein said insulation region includes a plurality of insulation regions separated by a portion of said substrate.

40. (Previously Presented) The PCB recited in Claim 36, wherein said insulation region is an opening that extends through said substrate and an insulator of said insulation region is air.

41. (Previously Presented) The PCB recited in Claim 36, wherein said insulation region includes an insulation material selected from a group consisting of:

ABS plastic;

ceramic; and

Teflon